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FLOOD INSURANCE STUDY

VILLAGE OF AMESVILLE, OHIO
ATHENS COUNTY

SEPTEMBER 29, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 390015

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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FLOOD INSURANCE STUDY

VILLAGE OF AMESVILLE,
ATHENS COUNTY,
OHIO

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Village of Amesville, Athens County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The hydrologic and hydraulic analyses for this study were performed by the U.S. Geological Survey (USGS), Water Resources Division, (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1823, Project Order No. 18. This study was completed in July 1987.

1.3 Coordination

On January 17, 1985, an initial meeting was held with representatives of FEMA; the Ohio Department of Natural Resources (ODNR), Division of Water; the Village of Amesville; and the Study Contractor. Coordination with town officials and Federal and State agencies produced a variety of information pertaining to floodplain regulations, community maps, flood history, and other hydrologic data.

On November 22, 1988, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of Amesville, Athens County, Ohio. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of Federal Creek was studied in detail.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through July 1992. The scope and methods of study were proposed to and agreed upon by FEMA and the Village of Amesville.

2.2 Community Description

The Village of Amesville is in northeastern Athens County, approximately 9 miles northeast of the City of Athens, and is surrounded by the unincorporated areas of the county. The village is served by State Route 550. The 1980 population of Amesville was reported to be 247 (Reference 1).

The average annual precipitation in the study area is approximately 39 inches and is evenly distributed throughout the year (Reference 2). Soils in the study area are primarily of the Chagrin-Nolin Association, which are characterized as deep, nearly level, well-drained soils and formed in floodplain alluvium (Reference 3).

2.3 Principal Flood Problems

The low-lying areas adjacent to Federal Creek within the Village of Amesville are subject to periodic flooding. The most extensive flooding in Amesville occurred in March 1963, during which the USGS reported that floodwaters were seven feet deep on Main Street (Reference 4). A flood of similar magnitude was reported to have occurred in the early 1920's.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent

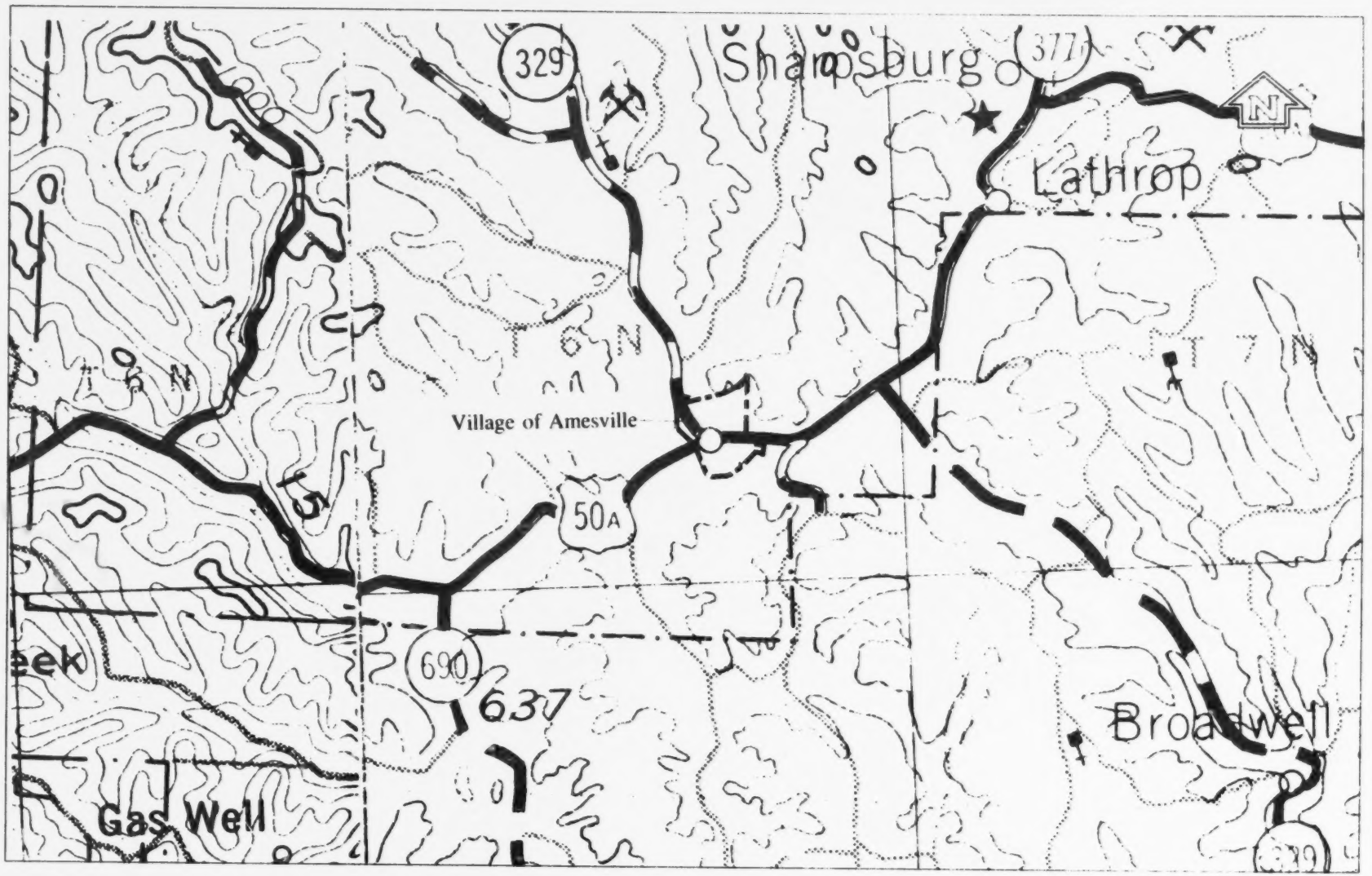


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF AMESVILLE, OH
(ATHENS CO.)

APPROXIMATE SCALE

1 0 1 2 3 MILES

VICINITY MAP

chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

The magnitude of the discharges for the 100-year recurrence interval was determined using ODNR methods of regional analyses (Reference 5). Those methods consist of regression equations that use topographic and climatic characteristics of the basin, based on regional analyses, to develop a flood-frequency curve. The equations are power equations based on drainage area and main-channel slope. Federal Creek is unregulated and there are no stream gage data available; therefore, no adjustments were made to the calculated discharges.

Peak discharge-drainage area relationships for the 100-year flood of Federal Creek are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 100-YEAR
FEDERAL CREEK		
just upstream of confluence of Sharps Fork	71.2	7,430
just upstream of confluence of McDougall Branch	32.1	4,910

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross-section data were obtained from field surveys. Geometric data for the new State Street bridge were provided by the Ohio Department of Transportation.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Roughness coefficients (Manning's "n") range from 0.045 to 0.055 for the main channel and from 0.04 to 0.10 for the overbank areas.

Starting water-surface elevations for Federal Creek were chosen based on data published in "Floods at Amesville, Ohio" (Reference 4), in which a step-backwater analysis was performed on a more extensive reach of Federal Creek. Water-surface elevations were determined using WSPRO, a step-backwater computer program (Reference 6).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 20 feet (Reference 7).

The 100-year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE). Small areas within the floodplain boundaries may lie above the

flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for Federal Creek lie outside the corporate limits.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than the state's allowable surcharge at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
FEDERAL CREEK								
A	8050	460	3068	2.4	631.4	631.4	632.1	0.7
B	8960	531	3606	2.1	631.7	631.7	632.4	0.7
C	10,840	580	3259	1.5	632.1	632.1	632.8	0.7
D	11,060	580	3420	1.4	632.2	632.2	632.9	0.7
E	11,970	550	2601	1.9	632.4	632.4	633.1	0.7
F	13,040	245	1250	3.9	633.1	633.1	634.0	0.9

[1]FEET ABOVE CONFLUENCE OF SHARPS FORK
[2]THIS WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF AMESVILLE, OH
(ATHENS COUNTY)

FLOODWAY DATA

FEDERAL CREEK

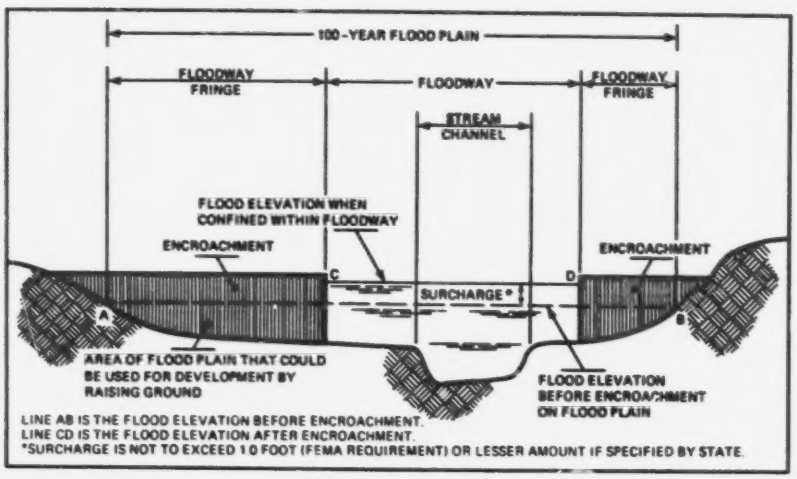

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction

with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The USGS report titled "Floods at Amesville, Ohio" (Reference 4) contains water-surface profiles and flood boundaries for the 5-, 25-, and 50-year floods in and around the Village of Amesville. Magnitudes for the floods of various recurrence intervals were determined by different methods in that study; as a result, the 50-year estimates are roughly equal in magnitude to the 100-year peak discharge estimates used in this study.

This Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the Village of Amesville, Ohio (Reference 8).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 175 West Jackson Boulevard, 4th Floor, Chicago, Illinois 60604-2698.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Ohio, Washington, D.C., February 1982.

2. Ohio Department of Natural Resources, Division of Water, Inventory Report No. 13, Hydrologic Atlas of Annual Precipitation, Temperature, Streamflow, and Water Loss in Ohio, 1962.

3. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Athens County, Ohio, 1985.

4. U.S. Geological Survey, Hydrologic Investigation Atlas HA-324, Floods at Amesville, Ohio, R.I. Mayo and E.E. Webber, 1969.

5. Ohio Department of Natural Resources, Division of Water, Bulletin No. 45, Floods in Ohio, Magnitude and Frequency, E.E. Webber and W.P. Bartlet, Jr., May 1977.

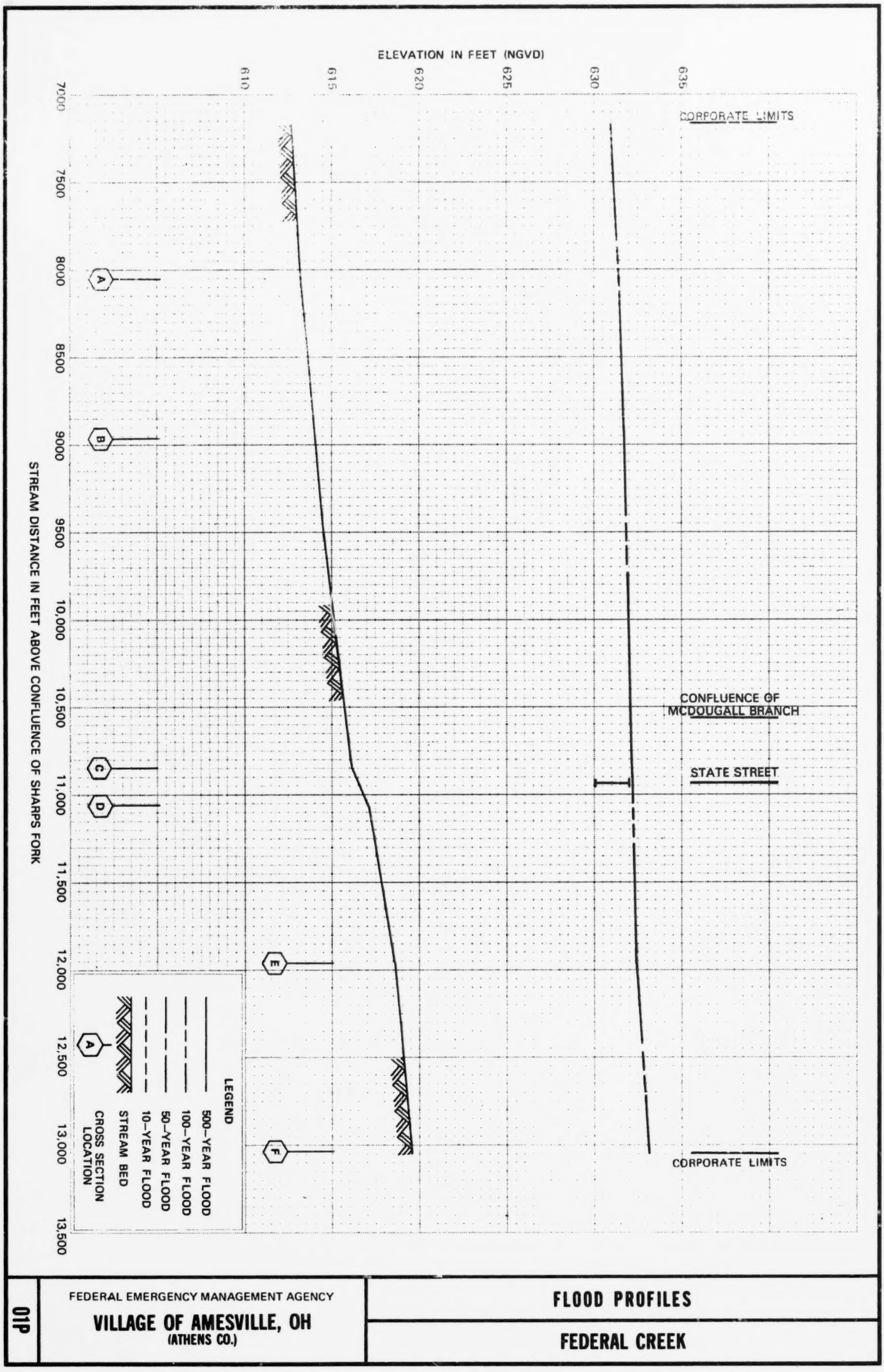
6. U.S. Department of Transportation, Federal Highway Administration, Report No. FHWA/RD-86/108, Bridge Waterways Analysis Model: Research Report, J.O. Shearman, W.H. Kirby, V.R. Snyder, and H.N. Flippo, July 1986.

7. U.S. Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 20 Feet: Amesville, Ohio, 1960, photorevised 1975.

8. Federal Emergency Management Agency, Flood Hazard Boundary Map, Village of Amesville, Athens County, Ohio, August 1981.

ELEVATION REFERENCE MARKS

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0001	635.94	chiseled square on northwest corner of flagpole base located in front of city hall about 100 feet south of intersection of State Street and Franklin Street



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FEDERAL EMERGENCY MANAGEMENT AGENCY

VILLAGE OF AMESVILLE, OH
(ATHENS CO.)

FLOOD PROFILES

FEDERAL CREEK